

**TRANSLATION****PATENT COOPERATION TREATY****PCT****INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>BR3581+P1RM/AMM</b>	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. <b>PCT/FR2004/002509</b>	International filing date (day/month/year) <b>05.10.2004</b>	Priority date (day/month/year) <b>07.10.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>C22C29/12, B22F3/00</b>		
Applicant <b>ALUMINIUM PECHINEY</b>		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>9</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																									
<p>4. This report contains indications relating to the following items:</p> <table><tr><td><input checked="" type="checkbox"/></td><td>Box No. I</td><td>Basis of the report</td></tr><tr><td><input type="checkbox"/></td><td>Box No. II</td><td>Priority</td></tr><tr><td><input type="checkbox"/></td><td>Box No. III</td><td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td></tr><tr><td><input type="checkbox"/></td><td>Box No. IV</td><td>Lack of unity of invention</td></tr><tr><td><input checked="" type="checkbox"/></td><td>Box No. V</td><td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VI</td><td>Certain documents cited</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VII</td><td>Certain defects in the international application</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VIII</td><td>Certain observations on the international application</td></tr></table>		<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand	Date of completion of this report																								
Name and mailing address of the IPEA/EP	Authorized officer																								
Facsimile No.	Telephone No.																								

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. I

Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-27 \_\_\_\_\_ as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- nos. \_\_\_\_\_ as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* 1-46 \_\_\_\_\_ received by this Authority on 18.08.2005 with letter
- nos.\* \_\_\_\_\_ received by this Authority on of 17.08.2005
- ☒ the drawings:
- sheets 1/1 \_\_\_\_\_ as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1-46</u>	YES
	Claims	<u></u>	NO
Inventive step (IS)	Claims	<u>1-46</u>	YES
	Claims	<u></u>	NO
Industrial applicability (IA)	Claims	<u>1-46</u>	YES
	Claims	<u></u>	NO
2. Citations and explanations (Rule 70.7)			
<p>Document US 3 380 920 (D5) was not cited in the international search report. A copy of said document is attached hereto.</p>			
<p>1. Document D1, which is considered to be the prior art closest to the subject matter of claim 1, describes (the references between parentheses apply to said document):</p> <ul style="list-style-type: none"><li>- a production method for a part that has a predetermined shape, is intended to form all or part of an anode for the production of aluminium via fused salt electrolysis (column 1, lines 13-16), and contains a cermet material consisting of at least one spinel-structure metal oxide and at least one metal phase (column 1, lines 11-13; column 4, lines 6-10), which method includes steps of:<ul style="list-style-type: none"><li>- preparing a powder that contains at least one spinel-structure mixed oxide, of which one of the components is a metal R (column 4, line 10) present in the form of cations;</li><li>- shaping said part by compacting the mixture</li></ul></li></ul>			

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(column 4, lines 49-51); and

- sintering said part (column 4, line 54 to column 5, line 4).

Moreover, the metal R, which is present in oxide form, can obviously be reduced during the production method for said part when the necessary (atmospheric, temperature, etc.) conditions are present.

It follows that the subject matter of claim 1 appears to differ from this known method in that:

- the oxide-reducing operation is not carried out in a reducing atmosphere only and is at least partially carried out using a carbon powder.

*In situ* reduction optimises the microstructure of the cermet anode, i.e. a dispersion of very small (micron sized), uniformly distributed metal particles.

The problem that the present invention is intended to solve can therefore be considered to be that of producing a cermet material in which the fine metal particles are uniformly dispersed within the ceramic matrix.

The solution proposed in claim 1 of the present application is considered to be inventive (PCT Article 33(3), for the following reasons:

- in the field of cermet production, the *in situ* reduction of the oxide by means of a carbon

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powder is a known alternative to the *in situ* reduction of said oxide in a reducing atmosphere (D5, column 2, lines 34-38). However, there is nothing in the prior art to indicate that the use of a carbon powder to reduce a cation in a metal R that is present in a spinel-structure mixed oxide would lead to a more uniform dispersion and a smaller metal particle size in the cermet part, in comparison with a reducing operation carried out in a reducing atmosphere only.

It follows that **claim 1** fulfils the requirements of PCT Article 33(1).

2. What is more, none of the prior art documents appears to describe or suggest the cermet material having a spinel matrix that is produced in accordance with claim 1 and characterised by the uniform distribution and the fineness of the metal particles therein (2 to 5  $\mu\text{m}$ , as per examples 1-3 and 5).

It follows that the use, in the production of aluminium via fused salt electrolysis, of an anode comprising a part produced by means of the method as per claim 1, and an electrolysis cell comprising an anode comprising a part produced by means of the method as per claim 1 appears to be novel and inventive.

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**Claims 45 and 44** comply with PCT Article 33(1).

No sintered cermet part as described in claim 46 is disclosed in the prior art, nor can such a part be derived in an obvious manner therefrom. It follows that **claim 46** fulfils the requirements of PCT Article 33(1).

3. **Claims 2-43** are dependent on claim 1 and, as such, therefore also fulfil the PCT requirements of novelty and inventive step.